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OUTLOOK
GOOD!

MAGIC 8-BALL SAYS:
MOISTURE METERS TAKE THE
GUESSWORK OUT OF WATERING

BY ROB THOMAS

Water is the lifeblood of a golf course. Without it, the turf cannot survive. Conversely, too much can be detrimental to turf health, as well as costly and environmentally unsound if coming through excessive watering practices. Many superintendents are foregoing the guessing game of when to water through the use of soil moisture meters.

Garrett Luck, has been at North Shore Country Club in Mequon, Wis., for 12 years, the last seven as head superintendent. It wasn't until 2011 that they began using soil moisture meters, starting with the FieldScout TDR 300 from Spectrum Technologies. He says their goal was twofold – first, to more effectively hand water greens.

“During the summer, especially during periods of high temperatures and humidity, we rely predominantly on hand watering,” Luck says. “This allows us to manage our bent/*Poa* greens with great success by reducing the risk of overwatering. After extensive use, we have established a threshold number at which the turf requires supplemental water. Staff has been trained to monitor the moisture values and various locations throughout the green and water only the areas that fall below our threshold.

“The second goal was to provide uniformly firm putting surfaces without sacrificing the health of the turf,” he adds. “By using the meter at various locations across all putting surfaces, we are able to dial in our moisture on all putting surfaces on the entire course.”

In 2012 Luck upgraded the irrigation control system to the Toro Lynx with VP controllers, including a set of Turf Guard soil monitoring sensors.

“I have been very impressed with these sensors that can be placed within the soil profile and monitor soil moisture, soil temperature and salinity,” he says. “While salinity is not an issue at NSCC, both the

moisture and temperature aspects have proven useful. Since certain pesticide applications are tied closely to soil temperature, we now properly time these applications with great certainty.”

Timing allows Luck to realize improved results and eliminates the needs for future applications, which is both good for the environment and the bottom line, he says.

“Perhaps the most important aspect of the Turf Guard system is its ability to feed real-time data back to our central irrigation computer,” Luck says. “This allows us to constantly monitor the moisture of our playing surfaces on our central computer, my iPhone, or my iPad. It is safe to say we water our greens considerably less now that we utilize this tool.

“The fact that the Turf Guard system documents all information

from the sensors could prove to be valuable in communicating with the membership,” he adds. “In situations where turf loss may occur on challenging areas, the data from the sensors could be used to explain the differences from one green to another.”

Alan FitzGerald, superintendent at LedgeRock Golf Club in Mohnton, Pa., started using the TDR 300 handhelds four or five years ago to get a better idea of how his turf and, in particular, the greens were performing. Prior to that he would base watering on what he could see in the field.

“I am a firm believer in deep and infrequent irrigation practices, so once I would see uniform wilting, I knew it was time to re-soak the greens,” FitzGerald says. “I thought the moisture meters would give me a little more guidance and let me know sooner than have the turf get too stressed out.

“It also helps in the days before the deep soak is due, as isolated dry spots start to appear,” he adds. “We know how much they need to be hit to carry the green through to watering with the overheads.”

FitzGerald adds the Toro Turf Guard in-ground sensors to monitor temperature, setting them to give notice once they reach a predetermined limit. Referring to them as a “snapshot” because of their placement, he installed the sensors in areas that give a good general indicator.

“I have two in a green I want to monitor – one in a known good/dry area, one in a wet/poorer area – so it gives a good average indicator of what's happening and can alert me to something before I can see by eye,” he says. “I've installed them in a number of greens that are good

KEY POINTS:

MOISTURE METERS

- Low learning curve
- Assess moisture primarily on greens
- Provides for consistent and firmer playing surface
- Develops benchmarks to recognize anomalies
- Defines greens moisture threshold

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COVER STORY

indicators of all the greens.”

FitzGerald initially installed Turf Guard at LedgeRock as a couple of pocketed greens started thinning out from lack of air movement. They took trees out and did as much culturally as possible, but still needed more air. The greens needed fans, but he knew it was going to be a major capital outlay.

“I had demoed the Turf Guard sensors so knew what they could do and show that a fan would help,” he says. “The board approved the purchase of the sensors and a fan to see if it made a difference. I was able to show a 2-4 degree difference in temperature at a 2-inch depth, which showed the fan was working.”

Since then he’s adds fans to all the “bad” greens, which now play just like the others on the course.

Add Andy Ragsdale, superinten-

dent at the Ritz-Carlton Golf Club in Orlando, Fla., and Mark Rawlins, CGCS at Longaberger Golf Club in Nashport, Ohio, to the list of those who use the TDR 300.

Rawlins was looking for a method to determine when areas of the greens were going to need irrigated to prevent wilt, but didn’t want to apply water if it wasn’t needed.

“[I] or the assistant superintendent will go around the course and check the high areas and the low areas of the greens and collars and record the moisture reading,” Rawlins says. “This will first be done in the morning, usually while changing the hole locations. We will know at this point if hand watering will need to be done that day. Depending on the weather, most days we will also check the areas in the afternoon just to make sure.”

FROM THE FIELD // Tool of the trade

The modern soil moisture meter has revolutionized the way turf managers apply one of Mother Nature’s most important resources – water. Manufacturers have given us the flexibility to monitor not only moisture levels, but also temperature and salinity from the same unit. This data allows us to take a more objective approach to scheduling our irrigation cycles and daytime hand watering. One of my greatest concerns about the use of this technology is the rate at which it is implemented into management practices. Yes, information can be collected soon after the installation of a sub-surface unit or through the use of a portable device, but it takes time to extrapolate the information needed to get the most out of these tools.

I often hear superintendents share their positive experience with soil moisture meters in an over-simplified, rudimentary manner. Ladies and gentlemen, this is not the fuel gauge on your car. We all know that when the low-fuel indicator appears on our dashboard that we ought to make it a priority to refuel, but the presence of an arbitrary number on a graph or LCD display doesn’t necessarily mean that it is or isn’t time to add water to a green, tee or fairway.

It may take an entire growing season to combine visual observations with the numeric data to create relationships that are most useful for your property. It’s only after this step that we may truly interpret and apply the information that is being collected by the moisture meters. For example, if the 10th green begins to exhibit drought stress at value X, we can evaluate our options and make a decision concerning the need for water. Furthermore, depending on how wide-spread the data collection is on your property, you can begin to group areas with similar characteristics. It’s unlikely that all putting greens on a golf course have the same moisture requirements. Instead of watering all greens, selectively water greens in groups. For example, Group A greens may only require deep watering every five days, whereas Group B may require watering every four days. Certainly allow for variations in this schedule as weather, chemical applications, and golfing events may require the watering schedule to be modified. In the end, this will allow for irrigating in a more predictable and efficient manner.



Jordan

Nate Jordan is a superintendent at Saratoga Lake Golf Club, Saratoga Springs, N.Y., and a frequent GCI contributor.



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FROM THE FIELD // Moisture Meter Basics

These days a golf course superintendent can only do so much with rolling and mowing and those practices are pretty consistent. Now the goal is firmness and consistency.

As such, handheld moisture meters have become a popular item with golf course superintendents. I talked with superintendents Eric Greytok, Belfair Plantation, Bluffton, S.C.; Jonathan Jennings, Shinnecock Hills Golf Club in Southampton, N.Y.; Tim O'Neill, Country Club of Darien, Darien, Conn.; and Pat Sisk, Milwaukee Country Club, River Hills, Wis.; about what portable meter they use and how they use it on their golf course. The Spectrum Technologies Field Scout TDR 300 seems to be the popular choice as all four superintendents were using it, each having two per 18 holes.

The meters come with different length probes. Sisk at Milwaukee Country Club is using 3-inch probes to manage the rootzone on his bentgrass greens, while O'Neill uses the 1-1/2-inch probes to manage on the greens at the Country Club of Darien. Greytok and Jennings were also using the 3-inch probes at Belfair and Shinnecock Hills, respectively.

While Sisk uses the meter to help fine tune his irrigation schedule, the other three superintendents are using the meter to aid in syringing their greens. Greytok, Jennings, and O'Neill use their meters to try and maintain a specific moisture range on their greens. Jennings says his "sweet spot" is between 12 percent and 17 percent moisture while O'Neill aims for 13 percent and knows that witting will occur at 10 percent. Greytok also has specific target moisture

levels he is aiming for and knows at what percentage witting will occur.

All four of the superintendents queried take a number of readings on greens, from as little as five to as many as 20 to obtain an average moisture content.

They probe known hot spots or other trigger areas first. With time they have discovered that the moisture members provide reliable information that can be used to indicate when syringing needs to take place. For example, O'Neill and Greytok can measure moisture on the greens between 9 a.m. and 10 a.m. and know at what time they will need to syringe their greens. Sisk probes his greens mid to late afternoon and uses those readings to adjust his nightly irrigation schedule.

All four superintendents report that you do not need a lot of experience to use the moisture meters and technicians tend to catch on rather quickly. They are using the meter primarily on the greens and only occasionally will take readings on tees and fairways. They report that using the meter provides for a more consistent, dryer and firmer surface and also develops benchmarks for differences and to recognize anomalies. The meter also helps to fine the threshold so greens can be kept at the edge, not too dry and not too wet.

Monitoring soil moisture with a portable probe is a useful tool to help maintain the desired level of firmness for many superintendents.

Brian Vinchesi is president of Irrigation Consulting Inc. and authors GCI's "Irrigation Issues" column.



Ragsdale says the process is as easy as walking across the green and checking 12-15 spots for the average reading.

"An irrigation flag could be used to mark areas that need to be hit with the hose, so all spots can be checked and then you can return to hit those dry spots after you put the meter away," Ragsdale says. "Most people know their spots and will go right to them with the meter, so a flag system is not needed."

While Ragsdale wishes more can be done with the meter's GPS and mapping system, Luck wants even more data.

"I would like to see the ability to include mini-weather stations on irrigation controllers that could provide real-time measurements of precipitation, wind, humidity and solar radiation throughout the course," he says. "I believe this could really lend a hand in better dealing with microclimates."

FitzGerald believes, in time, they will provide more data, but now is finding ways to use the data already available.

Handheld moisture meters have become a popular item with superintendents.



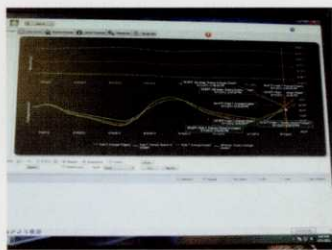
Sensors are placed within the soil profile to monitor moisture.



Superintendents do not need a lot of experience to use moisture meters effectively, and technicians tend to catch on to the technology rather quickly.



LEFT TOP, CENTER AND RIGHT: SPECTRUM TECHNOLOGIES; GARRIETT LUCK



Meters reduce the cost associated with struggling turf.

“Turf Guard’s ability to read temperature is nice and saved me last spring when I was able to see my soil temperatures were still not high enough for growth, even though early in the spring we had really warm daytime temperatures for a few weeks, which was followed by another few weeks of cold,” he says.

FitzGerald was able to use that info to hold off on “waking the turf up” during the first warm spell. “Once they told me growth had started and I made my fertilizer applications, the turf jumped to life rather than shutting back down and having to reawake up.”

Based on that, FitzGerald believes once more superintendents get out to test them, the more they may be able to be used to predict pesticide application timings, such as crabgrass and grub controls.

“As more people use them, I believe more uses will pop up. Like the spring warm up, I never even thought about that until last year and I realized I had the info at my fingertips,” he adds.

FitzGerald expressed a desire for some basic soil nutrient information, too, but says he wasn’t sure how useful it would be until he actually used it.

As for tangible benefits to using soil moisture meters, Rawlins has

seen plenty of advantages.

“It has improved the consistency of the greens,” he says. “We try to keep water off areas of the greens that don’t need it while applying water to the areas that require water. This helps to keep the speed and the firmness more consistent from green to green. The greens are healthier now because we can keep them drier, promoting deeper rooting.”

FitzGerald, who believes a little stress is good to keep the plant strong, says his greens are healthier because of the meters and doesn’t have to look back too far to see the cost of struggling turf.

“In 2010 when the ‘bad’ greens were struggling, I believe we spent in the region of \$12,000 in extra maintenance and labor nursing the greens through the summer (along with poorer playing conditions) which is now eliminated as the combination of the fans and being able to monitor moisture better has them perform as the others on the course,” he says.

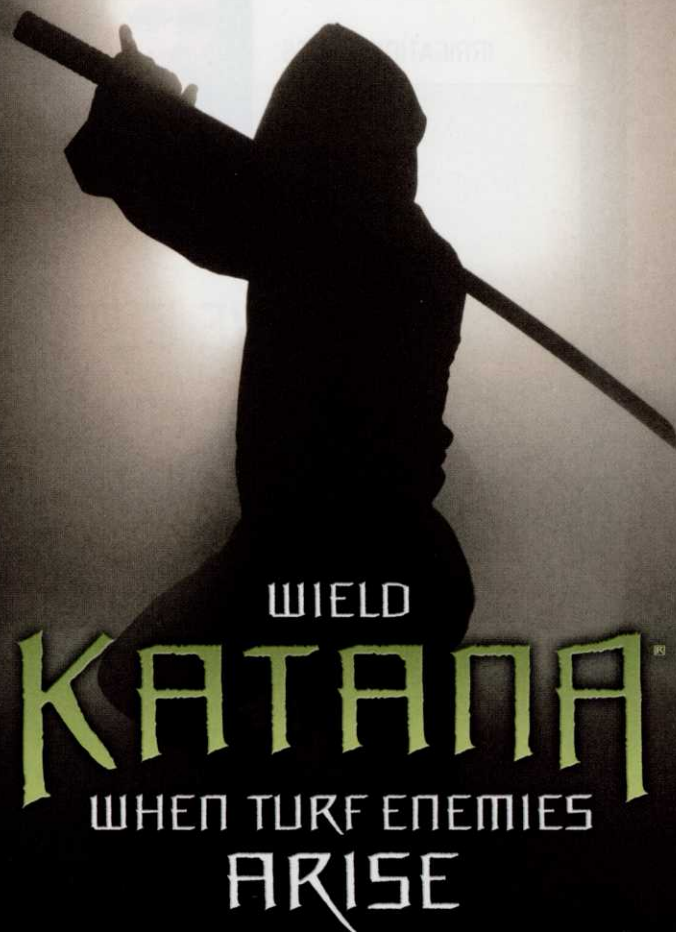
Hard to find a truly conflicting view of soil moisture meters, but Luck tried.

“The only downside I can see in using these meters is to become too dependent on them,” he says. “We still get paid to manage turf during difficult conditions, which requires hard work and long hours on the course.”

“During tough conditions, nothing will ever replace an afternoon tour of the course,” Luck says. “While these tools will never replace a hands-on, visual inspection, the peace of mind that comes from knowing you have adequate moisture on a Sunday afternoon is priceless.” GCI



The use of moisture meters has grown significantly in the last few years because they allow turf managers to quickly assess soil moisture content, which provides significant long- and short-term benefits. Check out this YouTube video of USGA’s Adam Moeller presentation to the Metropolitan Golf Association on moisture meters for better turf. Enter youtu.be/TO4eu2E4uvE into your web browser.



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Brian Vinchesi, the 2009 EPA WaterSense Irrigation Partner of the Year, is president of Irrigation Consulting Inc., a golf course irrigation design and consulting firm headquartered in Pepperell, Mass., that designs irrigation systems throughout the world. He can be reached at bvinchesi@irrigationconsulting.com or 978/433-8972.

ARE WE GETTING IT?

In today's golf business you cannot pick up an industry trade magazine, attend a conference or log into an Internet site without the mention of water and the fact that it is a dwindling/precious resource.

All of the Golf Course Superintendents Association of America (GCSAA) surveys for the last umpteen number of years have identified water as superintendents' No. 1 issue. It's also quickly becoming an issue for a golf course's management as a whole and not just the superintendent.

Last November, for example, the USGA hosted a Water Summit in Dallas to discuss golf's water use. Golf Course Industry itself devotes one whole issue a year just to water issues, specifically how to more effectively and efficiently use this resource. It's obvious that water use on golf courses is an issue. But do we really get it, or are we just giving it lip service?

In 2001, the GCSAA and the Irrigation Association (IA) recognized that water use on golf courses was becoming an issue and jointly developed a seminar called "Golf Irrigation Auditing." This two-day seminar discusses the relationship between the soil and plant and how they influence an irrigation schedule. The participants in the seminar go out to a golf course and audit an existing irrigation system. Auditing involves, among other things, putting out catch cans and measuring sprinkler uniformity and sprinkler spacing and taking pressure readings. The data collected provides with a little math, the lower quarter distribution uniformity (DULQ) and the net precipitation rate (PRNET) of the feature that was audited.

Auditing helps irrigation managers understand the interaction of the irrigation system with the soil, what the turf's water needs are and can provide solutions to why an irrigation system has poor uniformity. A golf course should strive for DULQ's of 0.7 to 0.8. The net precipitation rate provides the actual rate at which the sprinklers apply water and is much more accurate than the precipitation rate that is in your central control database, which is a theoretical calculation. The audit gives immediate visual and quantitative information on an individual feature or on a comparison basis.

The auditing seminar in addition to being

offered at the annual Golf Industry Show was/is available to chapters to be taught locally.

When the seminar was first developed, the classes were very full at each year's GIS show. Some years, there were two separate seminars. Very few GCSAA chapters however offered the seminar and last year the golf irrigation auditing seminar was not offered at GIS. This year (2013) the seminar was offered, but was cancelled due to low enrollment. I, for one, am having a hard time understanding how a seminar specifically designed to show people how to better understand the soil/water/plant relationship and how to irrigate more efficiently is getting so little interest from superintendents.

It's obvious that water use on golf courses is an issue. But do we really get it, or are we just giving it lip service?

Through my consulting work to do many audits, and the results are always eye opening to the superintendent. For example, I recently audited a green that had a precipitation rate of one inch per hour, but was being watered under the thinking that the irrigation applied less than ½ inch per hour. Audits are very educational for both superintendents and their staff and not very time consuming to perform. Once you know how to audit, it can be a valuable tool in a superintendent's tool box.

As time passes and this issue becomes more pressing, you will never have enough knowledge about water. The more you know about how your golf course uses water and how you can better utilize and reduce that consumption, the better off you will be. In the end, it won't matter what type of water you are using.

All water types are under scrutiny, with potable water uses becoming vulnerable in the near future. The more education we can receive the better off you and your golf course will be. Therefore, it would seem that taking an auditing seminar is a good way to increase that knowledge.

So, the bottom line: We hear about all of these water issues, but are we really getting it? **GCI**

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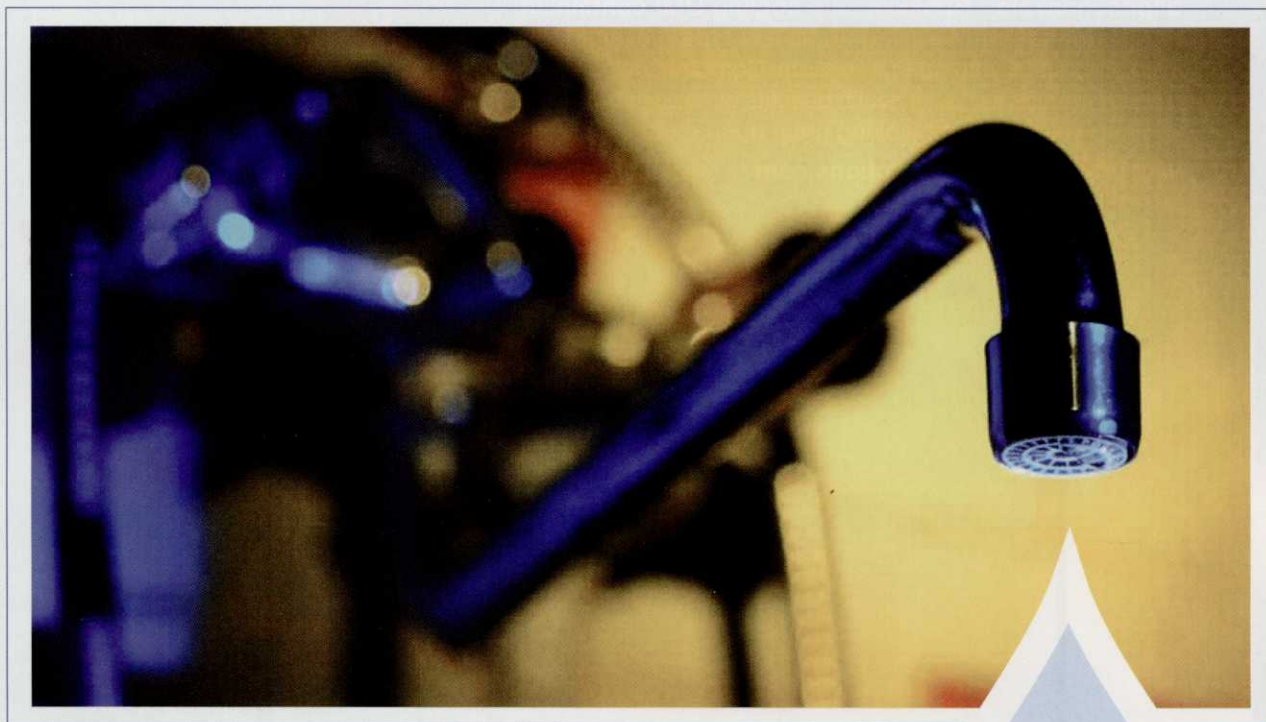
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Drop by

If I had a nickel for every time I witness water sample tests piled upon tests on shelves with information that is simply ignored or misunderstood, well I would probably be writing a novel on a beach instead of an article piece on an airplane.

The truth is that water quality is one of the most misunderstood parts of any golf course management program. So many get lost in the numbers and forget the

simple science behind what is important. Most importantly, we forget to carry through on the practical applications that address our water issues... something I have been privileged to do around the globe with many fine superintendents and property managers.

While considering any of this, please note that I have seen some very 'bad' water situations in the golf industry in particular. For one property in the San Diego,

Calif., area, the water was so bad that toxic residues would ring the irrigation pond like a halo. But because the superintendent thinks through his challenges there and knows what the limitations and effects of his water will do, he put a program in place that allows him to manage excellent playing conditions while limiting the impact of the bad water on his property. Look for a future article on the practical solutions to bad water...this article is

focusing on what to look for in a water quality test to know what your challenges may be.

First off, here are some truths about water quality:

- Water quality has a direct impact on soil and plant health quality on a daily basis
- The quality of the soil takes on the quality of the water over time
- Water quality can determine if an IPM program, including pesticide applications are